

**Table 06 Relay Screening Requirements (Page 1 of 3) (Notes 1, 2)**

Inspection/Test	Test Methods, Conditions and Requirements (Note 3)	Notes	Part Type/Grade Level	
			1	2
Cleaning and Small Particle Inspection	Manufacturer's approved procedure	4	X	X
Visual Inspection (External)	Materials, design, construction, header glass, marking, and workmanship	5	X	X
Mechanical Inspections	Critical physical dimensions	6	X	X
Initial Electrical Inspections	Table 06A		X	
Vibrational Scan (Sinusoidal)	MIL-STD-202, Method 204 Specified test condition (amplitude, frequency range, sweep time and duration) Specified electrical load conditions Specified contact load Contact monitoring to specification Contact transfer to specification	7, 8, 9, 10	X	X
PIND	Manufacturer's approved procedure	11	X	X
Internal Moisture Detection	Relay dwell with coils deenergized for 30 minutes at 20±5°C IR ≥ 10,000 megohms (between all contact pins together and case) Energize relay coil at 140% rated voltage for 2.5 minutes. Repeat for two-coil latching relays. IR ≥ 10,000 megohms (between all contact pins together and case)		X	X
High Temperature Soak	16 hours at maximum rated operating temperature Energize coil at 120% rated voltage. For two coil latching relays, alternately energize coils 4 hours at a time.		X	X
Run-In Tests	<u>Low temperature run-in</u> 1 hour dwell at minimum rated operating temperature Pickup or latch/reset voltage to specification Contact loading: open circuit load voltage at 10 to 50μV load current at 10 to 50μA Cycling rate: 60 actuations/minute Specified number of cycles Grade 1 - 2500 cycles Grade 2 - 2500 cycles Miss level: 100 ohms maximum		X	X

See notes on page C-18.

**Table 06 Relay Screening Requirements (Page 2 of 3) (Notes 1, 2)**

Inspection/Test	Test Methods, Conditions and Requirements (Note 3)	Notes	Part Type/Grade Level	
			1	2
Run-In Tests (continued)	<u>High temperature run-in</u> Rated coil voltage for 1 hour at minimum rated operating temperature For two-coil latching relays, 30 minutes each coil Pickup or latch/reset voltage to specification Contact loading: open circuit load voltage at 10 to 50μV load current at 10 to 50μA Cycling rate: 60 actuations/minute Specified number of cycles Grade 1 - 2500 cycles Grade 2 - 2500 cycles Miss level: 100 ohms maximum  <u>Room temperature run-in</u> 1 hour dwell at 25±5°C Pickup or latch/reset voltage to specification Contact loading: open circuit load voltage at 10 to 50μV load current at 10 to 50μA Cycling rate: 60 actuations/minute Specified number of cycles Grade 1 - 2500 cycles Miss level: 100 ohms maximum		X	X
Radiographic Inspection	MSFC-STD-355C		X	
Hermetic Seal	Fine leak: MIL-STD-202, Method 112 Test Condition C 1.0 X 10 <sup>-8</sup> cc/sec. or MIL-STD-883, Method 1014 Test Condition A1, A2, or B 1.0 X 10 <sup>-8</sup> cc/sec. Gross Leak: MIL-STD-883, Method 1014 Condition D		X	X
Final Electrical Inspections	Table 06A	12	X	X
Percent Defective Allowable (PDA)	Grade 1- 5% Grade 2- 10%	12	X	X

See notes on page C-18.

**Table 06 Relay Screening Requirements (Page 3 of 3) (Notes 1, 2)**

**Notes:**

- 1 This screening table is suitable for both low level and high level relays, latching and nonlatching. Unless otherwise specified, relays with dc resistive contact ratings up to and including 2 amperes shall be considered low level relays. Relays with dc resistive contact ratings higher than 2 amperes shall be considered high level relays.
2. Screening in accordance with MIL-R-39016, MIL-R-6106, MIL-R-83536, or GSFC S-311-P-754 is acceptable in lieu of the screening specified in this table.
3. It is the responsibility of the user to specify the test conditions and define the pass/fail criteria for each inspection. These values shall be based on the nearest equivalent military specification, the manufacturer's specification, or the application, whichever is most severe.
4. It is the responsibility of the user to approve manufacturer procedures for internal visual inspection and cleaning of relays prior to canning. Appendix A to MIL-R-83536 may be used as a guideline. These procedures must be documented, on file at the user's facility, and available for NASA review. The NASA/GSFC Parts Branch (Code 311) maintains a list of relay manufacturer approved procedures.
5. Header glass inspection shall be performed with microscopic power of at least 10X and shall include examinations for the following types of irregularities: blisters, foreign material, dark spots, cracks and chips. Meniscuses shall not extend up the terminal more than 0.20 inch or one-third the terminal diameter, whichever is greater.
6. A minimum of 3 relays shall be measured. In the event of a failure, the entire lot shall be screened for dimensions and rejects discarded.
7. All relays shall be vibrated in the direction of contact motion.
8. Contacts shall be monitored with an adequate test circuit to verify that no opening of closed contacts in excess of 10 microseconds, nor closing of open contacts in excess of 1 microsecond, occurs. The contact load shall be 10 mA maximum at 6 Vdc maximum.
9. Prior to removal from the test fixture, apply maximum over the temperature range pickup or latching voltage to the coil and verify that relay contacts have switched. Remove pickup voltage or apply reset voltage and verify that contacts have switched again. Failure of relay contacts to transfer in either direction shall be cause for rejection.
10. External visual examination required after testing to verify no evidence of mechanical damage.
11. It is the responsibility of the user to approve manufacturer procedures for particle impact noise detection (PIND). Appendix B to MIL-R-83536 may be used as a guideline. These procedures must be documented, on file at the user's facility, and available for NASA review. The NASA/GSFC Parts Branch (Code 311) maintains a list of relay manufacturer approved procedures for PIND testing.
12. Only the final electrical inspection results shall be used to determine the defect rate for the PDA.

**Table 06A Relay Electrical Inspections (Page 1 of 4) (Note 1)**

Inspection/Test	Test Methods, Conditions and Requirements (Note 2)	Notes	Part Type/Grade Level	
			1	2
DC Coil Resistance	MIL-STD-202, Method 303		X	X
Static Contact Resistance  or  Contact Voltage Drop	<u>Low level relays</u> MIL-STD-202, Method 307 Test load: 10 mA maximum at 6 V maximum (dc or peak ac) No actuations prior to measurement Measurements between all contact pairs One measurement for each of three actuations (use average value) Static contact resistance to specification  <u>High level relays</u> MIL-STD-202, Method 307 Test load: rated dc resistive contact current at 6 V maximum (dc or peak ac) No actuations prior to measurement Measurements between all contact pairs One measurement for each of ten actuations (use average value) Contact voltage drop to specification		X	X
Pickup, Hold, and Dropout Voltages  or  Latch/Reset Voltages	<u>Nonlatching relays</u> Gradually step or ramp coil voltage until the relay contacts switch Pickup voltage to specification Gradually reduce coil voltage to specified hold voltage No switching of contacts Gradually reduce coil voltage until contacts switch to their original state Dropout voltage to specification  <u>Latching relays</u> Gradually step or ramp latch coil voltage until the relay contacts switch Latch voltage to specification Remove latching voltage Gradually step or ramp reset coil voltage until the relay contacts switch Reset voltage to specification	3	X	X

See notes on page C-21.

**Table 06A Relay Electrical Inspections (Page 2 of 4) (Note 1)**

Inspection/Test	Test Methods, Conditions and Requirements (Note 2)	Notes	Part Type/Grade Level	
			1	2
Operate and Release Time	Use oscilloscope or other acceptable means to time each pair of contacts Measurements shall be exclusive of bounce or stabilization times Contact load: 10 mA maximum at 6 V maximum (dc or peak ac) Alternately apply and remove rated coil voltage a total of 5 times Operate and release time to specification based on the average of 5 consecutive measurements	4	X	X
Contact Bounce Time	Use oscilloscope or other acceptable means to time each pair of contacts Contact load: 10 mA maximum at 6 V maximum (dc or peak ac) Alternately apply and remove rated coil voltage a total of 5 times Contact bounce time to specification based on the average of 5 consecutive measurements	5	X	X
Contact Stabilization Time	Use oscilloscope or other acceptable means to time each pair of contacts Contact load: 50 mA maximum at 50 mV maximum (dc or peak ac) Alternately apply and remove rated coil voltage a total of 5 times Contact stabilization time to specification based on the average of 5 consecutive measurements	6	X	X
Dielectric Withstanding Voltage	MIL-STD-202, Method 301 Specified test voltage Leakage current to specification	7, 8, 9	X	X
Insulation Resistance	MIL-STD-202, Method 302 Test Condition A (relays with coil and contact ratings both < 60 volts) Test Condition B (other relays) Resistance (minimum) to specification	8	X	X
Coil Transient Suppression	Use oscilloscope or other acceptable means to observe magnitude of the induced voltage transient across the coil(s) Rated coil voltage The maximum of three consecutive readings shall be recorded Back EMF (induced voltage) to specification	10	X	X

See notes on page C-21.

**Table 06A Relay Electrical Inspections (Page 3 of 4) (Note 1)**

Inspection/Test	Test Methods, Conditions and Requirements (Note 2)	Notes	Part Type/Grade Level	
			1	2
Neutral Screen	Rated coil voltage to both coils simultaneously for a period of 10 milliseconds minimum Repeat three times Neutral screen to specification In the event of failure, apply a $10\pm 1$ ms pulse at maximum allowable latch voltage (at 25°C) Latch to specification Apply $10\pm 1$ ms pulse at maximum allowable reset voltage (at 25°C) Reset to specification	11, 12	X	X
Non-Make-Before-Break	Rated pickup, latch or reset voltage Contact load: 10 mA maximum at 6 V maximum (dc or ac peak) Energize and deenergize 10 consecutive cycles Non-make-before-break to specification		X	X

**Notes:**

1. This table is suitable for both low level and high level relays, latching and nonlatching. Unless otherwise specified, relays with dc resistive contact ratings up to and including 2 amperes shall be considered low level relays. Relays with dc resistive contact ratings higher than 2 amperes shall be considered high level relays.
2. It is the responsibility of the user to specify the test conditions and define the pass/fail criteria for each inspection. These values shall be based on the nearest equivalent military specification, the manufacturer's specification, or the application, whichever is most severe.
3. For screening, the mounting position of the relay is optional.
4. Release time is not applicable to latching relays.
5. A contact bounce shall be considered any occurrence equal to or greater than 90 percent of the open circuit voltage with a pulse width of 10 microseconds or greater. Lesser values are considered to be dynamic contact resistance.
6. Contact stabilization time is the maximum time allowed for the contacts to reach and maintain a static contact resistance state following the actual operate or release time of the relay. Essentially, it is the sum of the contact bounce time plus the time required for the dynamic contact resistance to stabilize to static contact resistance.
7. The DWV test duration shall be 5 seconds minimum.
8. Points of application for testing: (1) between case, frame or enclosure, and between all contacts in the energized and deenergized positions; (2) between case, frame or enclosure and coil(s); (3) between all contacts and coil(s); (4) between open contacts in the energized and deenergized positions; (5) between coils of dual-coil relays; (6) and between contact poles in the energized and deenergized positions.

## **Table 06A   Relay Electrical Inspections (Page 4 of 4)**

### **Notes (Continued):**

9. External visual examination required after testing to verify no evidence of mechanical damage.
10. Applicable only to dc operated relays with diodes for coil transient voltage suppression.
11. Applicable only to latching relays.
12. A relay which will not assume a neutral position for three successive test cycles is considered an acceptable part and does not require further testing.